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Multi-stakeholder forum on science, technology and innovation for the Sustainable Development Goals: summary by the Co-Chairs

Note by the President of the Economic and Social Council

The President of the Economic and Social Council has the honour to transmit to the high-level political forum on sustainable development the Co-Chairs' summary of the multi-stakeholder forum on science, technology and innovation for the Sustainable Development Goals, held in New York on 6 and 7 June 2016. The Co-Chairs of the forum, the Permanent Representative of Kenya to the United Nations, Macharia Kamau, and the Science and Technology Adviser to the Secretary of State of the United States of America, Vaughan Turekian, were appointed by the President of the Council. The summary is being circulated pursuant to paragraph 123 of the Addis Ababa Action Agenda (General Assembly resolution 69/313) and paragraph 70 of the 2030 Agenda for Sustainable Development (Assembly resolution 70/1).

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Co-Chairs' summary of the multi-stakeholder forum on science, technology and innovation for the Sustainable Development Goals

I. Introduction

1. Pursuant to General Assembly resolution 70/1, on 6 and 7 June 2016, the President of the Economic and Social Council, Oh Joon, convened the first annual multi-stakeholder forum on science, technology and innovation for the Sustainable Development Goals. As a component of the Technology Facilitation Mechanism, the forum is a venue to discuss cooperation in science, technology and innovation around thematic areas pertaining to the implementation of the Sustainable Development Goals, bringing together all relevant stakeholders to actively contribute in their areas of expertise. The forum provides a venue for facilitating interaction, matchmaking and the establishment of networks between relevant stakeholders and multi-stakeholder partnerships in order to identify and examine technology needs and gaps, including with respect to scientific cooperation, innovation and capacity-building, and to help to facilitate the development, transfer and dissemination of relevant technologies for the Goals.

2. The Permanent Representative of Kenya to the United Nations, Macharia Kamau, and the Science and Technology Adviser to the Secretary of State of the United States of America, Vaughan Turekian, co-chaired the forum. The forum was prepared by the United Nations inter-agency task team on science, technology and innovation for the Sustainable Development Goals, with the support of 10 representatives from civil society, the private sector and the scientific community. The President of the General Assembly, Mogens Lykketoft, and the Secretary-General made statements at the opening of the forum.

3. The forum was well attended, with more than 600 participants representing 81 Governments and more than 350 scientists, innovators, technology specialists, entrepreneurs and civil society representatives. The forum included innovative seating arrangements and interactive sessions that provided adequate time for discussion among all stakeholders. Pursuant to its mandate, the forum experimented with ways to promote networking and matchmaking, including online discussions, an exhibition and side events.

II. Highlights of the discussions at the forum

Mobilizing science, technology and innovation for the Sustainable Development Goals

4. The 2030 Agenda for Sustainable Development and the Sustainable Development Goals contained therein are disruptive. They imply a radical departure from business as usual. Over the coming 15 years, the global community will have the important task of taking full advantage of science, technology and innovation for sustainable development. Science, technology and innovation are central to the advancement of the 2030 Agenda and the Goals. They will need to be responsive to the needs of the Goals and should be conceived as means of achieving them, not as ends in themselves. Not every problem has a high-technology solution, and not all

technological change is conducive to sustainable development. Going forward, it will be critical to assess how technology can be mobilized to provide solutions to our greatest challenges. In that respect, various sources of knowledge, including indigenous knowledge, should be considered. All that is likely to require new ways to approach the science-policy interface.

5. The current technological revolution is having an impact on all disciplines, industries and the world's economy. Rapid advances in information and communications technologies (ICT), energy technology, biotechnology, nanotechnology, neurotechnology and other technologies will affect all sectors of the economy, including manufacturing, construction and transportation. Taking advantage of those technologies to advance social and economic inclusion, as well as to promote environmental sustainability and peace, will call for a transformation of societies. New technologies will emerge, while those that are currently nascent will be commercialized. With respect to the role of science, technology and innovation, it is necessary to look beyond the coming 15 years, given that the transformations that are required have longer time horizons.

6. The Technology Facilitation Mechanism should mobilize science, technology and innovation solutions for the 2030 Agenda and the Goals in order to achieve transformative change in livelihoods across the world. In that context, the forum needs to continue to work in a practical operational mode.

Inclusive technology that leaves no one behind

7. The imperative of the 2030 Agenda is to leave no one behind. That imperative should underpin the way in which we think about science, technology and innovation. The focus should be on how social needs can drive and transform science, technology and innovation, a shift from the dominant model of science, technology and innovation being "applied to" social problems. That entails new ways of looking at the interface between society and science, technology and innovation, new kinds of social expertise to be associated with science, technology and innovation activities, institutionalized community and civil society participation and new kinds of science, technology and innovation policy and practice overall.

8. Science, technology and innovation capabilities are not evenly distributed across countries. A lack of adequate technological infrastructure, such as limited Internet access, has held back many developing countries. It is important to promote the development and use of ICT, especially in the least developed countries, landlocked developing countries and small island developing States.

9. Existing technological divides have an impact on vulnerable groups such as women, indigenous peoples and persons with disabilities. There remains a gap between those that can scale up technologies (such as large corporations) and those that produce innovations that serve the poor. The effective implementation of the Goals will require identifying and addressing major knowledge gaps across domains, disciplines and regions.

10. Technological change is not neutral; it can favour either labour or capital. Technological change is, in essence, disruptive and, in the short term, creates winners and losers. While disruptive technologies will be critical to a transformation towards sustainable development, their benefits may disproportionally go to people in the countries that innovate or to a small fraction of the population. Going

forward, it will be essential to ensure that those who are vulnerable and marginalized are not left behind in that process and share in the benefits and knowledge acquired. For example, efforts are needed to enhance skills and social protection for the labour force, given that jobs are threatened by the digital revolution. Small and medium-sized companies need to be able to participate in the digital revolution, and local innovation and entrepreneurship systems need to be able to fully participate in the implementation of the 2030 Agenda.

11. Enabling access to technologies will be a critical element of a strategy to fully mobilize the potential of science, technology and innovation for the Goals. Technological advances should benefit everyone, not just a few. Ensuring the inclusive participation of citizens, especially underrepresented groups such as women, in innovation and entrepreneurship is essential. Technological tools, if adequately provided to communities and peoples, can help them to develop solutions that reflect their own priorities. Technology should aim to make communities more cohesive rather than generate social disruptions.

12. Research into cutting-edge, disruptive technologies should be accompanied by a consideration of how to adapt existing technologies to make them less expensive and more accessible to the poor (i.e., "frugal innovation") and repurposing existing technologies for new situations (i.e., "hybrid innovation"). Attention should also be paid to the contribution to the Sustainable Development Goals of technologies in the middle of the spectrum between low-technology, grass-roots technology and high-technology; those technologies often are under intellectual property protection.

Striking the right balance between "hard" and "soft" technologies

13. Efforts should focus not only on developing and deploying highly advanced and efficient "hard" technologies, but also on supporting "soft" or "social" technologies. Social technologies are critical to changing mindsets, attitudes and behaviour. Better understanding the determinants of technology adoption by people and communities is important in that regard. It is also important to take into account the resistance of professional communities to the adoption of new or innovative approaches. Social technologies are also critical to reaching those left behind, as are public policies and social and community participation. For example, in the health sector, instituting a national vaccination day or finding practical ways to bring the right medication to people who need it in time may be as important as research into new vaccines.

14. In order to work, technologies have to be adapted to local contexts and culture. Young people can help to adapt technologies to local contexts and translate them into local languages, in particular in marginalized communities. The concept of "technology readiness" and associated models used to evaluate readiness can help to assess the potential of technologies in different environments, given that on-site experimentation is rarely possible. The concept of readiness should fully incorporate ethical and cultural dimensions.

15. Technology in isolation has limited transformative impact. Providing the right incentives and empowering communities are important for leveraging technologies, as illustrated by many examples featured at the forum. In the case of food waste, an example presented emphasized that, in addition to the use of straightforward technology to match producers of food waste with the demand for food, in order for

the solution to succeed, it was necessary to work on the incentives faced by firms (such as helping firms to take advantage of tax deductions for donating food).

Strengthening science, technology and innovation capacity, science, technology and innovation literacy and human skills

16. People are a nation's greatest natural resource. Actions and policies that strengthen science, technology and innovation and human capacity-building in every country are needed to create knowledge-based, innovative societies that utilize scientific evidence to help to inform policy and inspire science-based solutions.

17. Enhancing science awareness among the general population is important to creating a culture of innovation in society. There is a need to proactively foster the next generation of researchers and scientists and to foster the contribution of citizens to scientific discovery.

18. Youth participants highlighted a number of challenges that need to be addressed to effectively bring more young people into science, technology and innovation and sustainable development. Learning how to learn is critical. It is important to create environments conducive to active learning that evaluate students beyond their grades and their classrooms, that inspire and facilitate early access to science, technology and innovation and that take young innovators seriously. Schools and other learning environments should aim at educating creative problem solvers and critical thinkers and be responsive to gender and other social markers to create a level playing field for both boys and girls. Formal education in science, technology, engineering and mathematics needs to be supported and its reach widened in order to build science, technology and innovation literacy among young people. Out-of-school environments are also important, as are innovative curricula that incorporate creativity, collaboration and the building of problem-solving skills, which are often not foci of formal curricula but are critical to powering innovative mindsets and creating the partnerships necessary to mobilize talent and resources to tackle development challenges. New technologies can help to educate children who have no or inadequate access to school and to promote literacy. Democratizing access to science, technology and innovation, including access to computer science education that teaches young people coding, would stimulate millions of innovators around the world.

19. Governments may need to redesign science systems so that they stimulate research that addresses problems of relevance to sustainable development. That needs to be done in a way that preserves the integrity of scientists and the scientific process. Changes in educational systems and curricula delivery can be considered as part of the strengthening of enabling environments to support science, technology and innovation development.

Enhancing the coherence of science, technology and innovation policy

20. The coherence of science, technology and innovation policy needs to be advanced at all levels in order to accelerate technology transfer, technology diffusion and innovation in a manner that is commensurate with the ambitions of the Goals. Coherence must also be achieved between science, technology and innovation policies in general and those focused on supporting the 2030 Agenda. In that endeavour, Governments will need to proactively collaborate and innovate with

scientists, experts, the private sector, communities, civil society and users of technologies.

21. Achieving all the Goals will require integrated assessment tools to find desirable pathways that resolve trade-offs and maximize synergies. It will require robust legal environments that promote innovation. Those involve not only science, technology and innovation policy, but also trade policy, intellectual property protection and other key areas. It is important to put in place country-specific policies on intellectual property rights that make sense for all involved. One example highlighted in that regard was the new intellectual property rights policy of the Government of India. The benefits of encouraging open data and open innovation were emphasized in order to share data and improve access to research. Other examples discussed at the forum included identifying emerging science, technology and innovation issues, supporting education among and research by stakeholders on the intellectual property regime, providing facilities in universities for all students to develop entrepreneurship efforts, building infrastructure to ensure that young people and others are able to engage and interact with policy and community leaders and examining Internet protocols in order to harmonize them.

22. Coherent policies should lead to coordinated approaches to enhance partnerships and proactively involve the private sector, which is already working on low-cost scalable technologies and the Goals. Policies could encourage grass-roots solutions connecting innovative people with technologies and finance. Policies must be put in place to support innovators operating outside formal institutions and structures, for example those who are out of school and are innovating in order to meet local community needs.

23. Coherent policies must lead to adequate and diverse funding of science, technology and innovation in order to plant the seeds for innovative research. Indeed, funding agencies and ministries set the agenda for what they want their scientists to pursue. There are countless examples of successful non-governmental organizations and companies that have emerged out of government seed funding. A balance needs to be struck between funding for disruptive and high-performance technologies on the one hand and inclusive innovation that focuses on the needs of the poor on the other. The balance will differ between countries and between the private and public sectors. The Goals themselves reflect the need for both types of innovation.

Science, technology and innovation action plans and technology road maps

24. Science, technology and innovation policies need to do a better job of linking to and tackling development challenges. Flexible science, technology and innovation action plans and technology road maps at the national and global levels are needed to support the achievement of the Goals. They could be a means of uniting all interested stakeholders, including financiers, to work towards common goals and to benefit from periodic scientific analysis. They require leadership and need to be adequately resourced. Whole-of-economy approaches will be needed. Innovation ecosystems have to function effectively, be economically sustainable and provide shared value. For example, Mauritius has made major strides in defining a strategy for a transition to an ocean-based economy, based on the precise identification of the required economic activities (including shipping, aquaculture, the seaweed industry, tourism and new energy and water technologies), underlying

technology developments and social requirements. The design of science, technology and innovation action plans should be inclusive and involve all stakeholders from the outset.

25. Participatory technology assessment and prospective analysis (e.g., of the impact of technologies on employment) could be useful. There is a role for foresight and horizon scanning exercises going forward, including for examining technologies that are currently risky and unproven. A project on the world in 2050 was mentioned in that context.

Creating robust science advisory ecosystems at all levels

26. Science and technology need to work with society in the co-design and co-production of solution-oriented knowledge and in the process of social innovation. In that endeavour, scientists, decision makers, policy analysts, the private sector and citizens need to work together closely. Each society can benefit from strengthening its science-policy interface and creating what may be termed a "science advisory ecosystem", whereby its scientific and technological community can provide input and advice on public policy issues. The creation of robust science advisory ecosystems at all levels could help societies to inclusively leverage their scientific and technological communities to provide high-quality, independent and credible scientific and technological insight. Science advisory ecosystems are needed globally and nationally to assess progress with regard to the 2030 Agenda and the Goals and to identify gaps in policy and science.

27. National experiences with creating science advisory ecosystems were shared. The Government of Japan recently created the position of science adviser to the Minister for Foreign Affairs. China described major science policy efforts aimed at building the social responsibility of scientists and a social culture of innovation and experimentation. The Brazilian National Institute of Science and Technology for Innovation in Neglected Diseases emphasized the importance of social and financial innovation.

Using information and communications technology tools, forums and platforms to support science, technology and innovation

28. To achieve the Goals, we need a paradigm shift in how science interfaces with technology. The Internet is transformative and provides a model and platform for all technologies. ICT tools, forums, and platforms could be more effectively used by people to learn from one another, encourage citizen-driven science and ultimately serve as a platform for the spread of other technologies across societies. Information technology-based platforms, including social media and mobile broadband, can be used for sharing knowledge, information, experience and advice on relevant policies, actions, partnerships, technologies and research and development outcomes. In that context, technology infrastructure could be considered a public good.

29. ICT can also help to connect people, innovators, entrepreneurs, financiers and funding agencies in a way that was not possible a few years ago, improving the prospects for collaboration and partnerships to connect the supply of and demand for innovation. ICT platforms can play a critical role in making Governments aware of innovators and innovations in their own countries. By providing business intelligence on what innovations are funded by whom, they can help to reduce the

duplication of work among development agencies. The Global Innovation Exchange was presented as an example of such a platform. The online platform foreseen as a component of the Technology Facilitation Mechanism may play a role in that regard in the future.

30. Many technology developments are possible only because they are based on the successful application of basic scientific knowledge, which has taken decades to create. Standards and formats need to be deployed to improve global access to basic scientific knowledge and simplify technology use. For example, data on basic technological innovations are currently scattered across scientific publications and academic journals in PDF format, instead of being accessible in standardized databases. Creating modern databases of knowledge and basic research relevant to the Goals would provide innovators with critical enabling tools.

31. ICT tools can help communities develop inclusive technologies that reflect their own priorities and needs. New technologies have also enabled the development of collaborative models and learning platforms based on open-source applications and the sharing of data. An example in the field of education was presented, whereby educational content is digitized and made engaging for children. Stakeholders can customize the content and run various tests of what is most effective. The data are shared with all interested stakeholders and communities. Such models illustrate that there can be incentives for developers to share content and applications in exchange for data.

32. New technologies such as mobile phone technology have allowed countries to leapfrog. Paradoxically, because infrastructure development is path-dependent, a lack of infrastructure can foster leapfrogging. Examples include agriculture (such as farmers using smartphones to access information on food prices, weather conditions and forecasts of locust outbreaks), the use of air quality sensors and the use of real-time data monitoring technology.

International cooperation

33. International cooperation in capacity-building has to occur at a level that is commensurate with the ambitions of the Goals. Developing countries need special support in that regard. The more developing countries are engaged in the technology development process, co-designing and co-adapting technologies, the more they will become sources of knowledge themselves. International cooperation, based on the right incentives, could increase cost-effectiveness, address market failures and improve economic efficiency.

34. All forms of cooperation and partnerships, including South-South, North-South and triangular cooperation, should be encouraged in order to facilitate access to science, technology and innovation. Regional cooperation on problems of common concern and voluntary technology cooperation agreements are important. At the level of the United Nations, the proposed technology bank for the least developed countries and the Technology Facilitation Mechanism could play a role in such agreements. Specific guidelines on technology transfer to developing countries that address the conditions of transfer, evaluation and replication of technology are needed. In that context, the Global Environment Facility has developed a series of pointers for developing countries.

III. Recommendations for the science, technology and innovation forum

35. Going forward, the forum will provide an opportunity to strengthen dialogue between stakeholders and Governments and promote a conducive environment for the sharing and exchange of ideas and success stories in scientific collaboration, innovation, technology transfer and diffusion, and for new initiatives and partnerships. It can help to identify practical means and solutions to foster science, technology and innovation in all countries. In that respect, the forum should consider various sources of knowledge, including indigenous knowledge, and facilitate exchanges on science, technology and innovation solutions. The forum may serve as a venue to provide specific, practical guidance on how to make science, technology and innovation for the Goals a reality, including how to enhance the transfer of environmentally sound technologies to developing countries.

36. In terms of governance, working methods and activities, the forum could take inspiration from other mechanisms such as the Internet Governance Forum, which was mentioned as an example of a successful multi-stakeholder mechanism working at various levels.

Promoting networking and matchmaking

37. There is a need to ensure multi-stakeholder participation in the forum and that the contributions of experts, technology users, change agents, young people, the private sector, academic institutions and all other relevant stakeholder groups are taken into account. The forum also needs to reflect the perspectives of the poor. The forum could become a platform at the global level for the science, technology and innovation community and its full diversity of stakeholders to jointly create the conditions of possibility for transformative, solutions-oriented science, technology and innovation by fostering international coordination and multi-stakeholder collaboration and, where necessary, providing support to manage the disruptions to science, technology and innovation policy and practice that will be generated. That includes conveying locally determined needs to achieve the Goals and presenting useful and proven technologies developed by communities and local innovators.

38. The first forum experimented with ways to promote networking and matchmaking, pursuant to its mandate. In one example, innovators selected from a large number of respondents to an open call for action had a chance to present their innovations, and other participants expressed an interest in helping some of the respondents to gain access to funding. Open calls for innovation could be a recurrent feature of future forums, to help source, fund and deploy technology solutions to specific Goal challenges. In that context, the forum could facilitate access to funding for outstanding innovations with the greatest Goal impact. It would be important to expand participation in the forum to include the financial sector, especially providers of early-stage finance, who could be matched with participating innovators.

39. Between annual sessions of the forum, the 10-member group to support the Technology Facilitation Mechanism and the United Nations inter-agency task team on science, technology and innovation for the Sustainable Development Goals may promote activities that catalyse and enable stakeholder engagement in the Mechanism and that foster the inclusion of existing initiatives and organizations that

also promote science, technology and innovation for sustainable development. That can be done around cross-cutting themes, such as data collection and availability, or for specific sectors, such as health and education.

Forum as a catalyst for multi-stakeholder partnerships

40. Governments need to collaborate and innovate with all types of stakeholders and experts to leverage science, technology and innovation to achieve the Goals. In that context, the United Nations needs to continue to support such cooperation through its convening power. In particular, the forum has to serve as catalyst for multi-stakeholder partnerships that include the private sector. It needs to link closely with and bring together existing initiatives, such as the International Network for Government Science Advice, the Global Research Council, the Future Earth initiative, the African Innovation Foundation, private-public academic partnerships and the Global Young Academy, as well as development and research funding agencies at the national, regional and global levels.

41. Numerous examples of successful multi-stakeholder partnerships were featured at the forum, such as Saving Lives at Birth: A Grand Challenge for Development; For Inspiration and Recognition of Science and Technology, which has promoted science and technology among children in 46,000 schools in 86 countries; and Copia, which addresses hunger and food waste through technology. The forum should support the sharing of experiences with those partnerships and learning from their organizational models. Similarly, the forum needs to be coherent with and link closely to ongoing science, technology and innovation activities at the global, regional and national levels, many of which were mentioned in the course of the forum. Examples of other organizations working on science, technology and innovation mentioned specifically included the proposed technology bank for least developed countries, the Climate Technology Centre and Network, the Asian and Pacific Centre for Transfer of Technology and the science and technology programmes of the European Commission. The Commission on Science and Technology for Development was specifically mentioned as an institution within the United Nations with a mandate to provide high-level advice on science, technology and innovation to both the General Assembly and the Economic and Social Council. Synergies should be established with its work programmes and meetings, which also include input from stakeholders.

Making future science, technology and innovation forums work cumulatively over the coming 14 years

42. The forum must be action-oriented and cumulative in its impact. Over the coming 14 years, future forums should learn from and advance the achievements of previous forums. In that context, various proposals were made, including for intersessional meetings and regional and/or national science, technology and innovation forums, events and activities, in addition to global online discussions and more systematic ways of involving civil society. Several proposals were made on how to make the forum itself more interactive, including break-out sessions. In that regard, it was suggested that the break-out sessions could focus on targets of the Goals that were primarily focused on technology, including specific targets relating to education, gender, health and the Internet, as well as others that could benefit from science, technology and innovation.

43. The forum should become the outcome of an annual programme of results-oriented activities and, as part of a series, provide a regular opportunity to collaboratively define priorities for action. Activities could address specific objectives such as monitoring and sharing information on trends in the deployment of science, technology and innovation for the Goals; showcasing specific solutions and achievements (such as social and technological innovations, the development of national policy road maps, multilateral resource mobilization for science, technology and innovation); collecting, coordinating and making available state-of-the-art expertise on specific issues and practice areas (e.g., science, technology and innovation training and education, capacity-building and mobilization, science advising, the development and diffusion of inclusive, transformative technologies, technology assessment and open data/digital platforms); implementing horizon scanning and technology foresight activities; identifying emerging priorities, critical knowledge and innovation gaps and "neglected" Goals and targets, and identifying and assessing ways of mobilizing science, technology and innovation responses to address them; continuing to build a community of collaborators as part of United Nations initiatives on the use of science, technology and innovation for the Goals, and providing effective matchmaking opportunities. The 10-Member Group to Support the Technology Facilitation Mechanism and the United Nations inter-agency task team on science, technology and innovation for the Sustainable Development Goals have offered to further refine those objectives and develop specific action to support those objectives.